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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,791	12/01/2003	Michael B. Korzenski	ATMI-686	1912
25559	7590	08/24/2005	EXAMINER	
ATMI, INC. 7 COMMERCE DRIVE DANBURY, CT 06810			UMEZ ERONINI, LYNETTE T	
			ART UNIT	PAPER NUMBER

1765

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/724,791

Applicant(s)

KORZENSKI ET AL.

Examiner

Lynette T. Umez-Eronini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 17-38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 17-38 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 December 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicants' election with traverse of Group I claims 1-16 in the reply filed on 6/15/2005 is acknowledged. The traversal is on the ground(s) that the rationale for the restriction is in error because the former Office Action states, "the product as claimed can be used in a materially different process of using that product such as a process of cleaning a photoresist post-etch residue" wherein the composition as recited in claim 1 is the same as that recited in method claim 17. This is not found persuasive because method of claim 17 is broadly directed to removing a silicon-containing substances from a substrate having same thereon and fails to exclude the method of removal (i.e. cleaning, etching, or stripping) by using the composition of claim 1.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-7, 10-12, 14, and 15 are rejected under 35 U.S.C. 102(2) as being anticipated by Xu et al. (US PG PUB 2003/0125225 A1).

Xu teaches a chemical formulation for removing unwanted material from a semiconductor substrate by utilizing a supercritical fluid-based cleaning composition, which may further include co-solvent, surfactants, chelating agents, and or chemical reactants (Abstract). The supercritical fluid comprises a fluid species selected from the group consisting of carbon dioxide, oxygen, argon, krypton, xenon, ammonia, and mixtures thereof [0010, 0016, and 0045]; co-solvents species selected from the group consisting of methanol, ethanol, and higher alcohols [0017]; surfactant species such as acetylenic alcohols and diols, (same as applicants' nonionic surfactant) [0046]; and etching gases such as, xenon difluoride [0053]. The aforementioned reads on,

A sacrificial silicon-containing layer etching composition, comprising a supercritical fluid (SCF), at least one co-solvent, at least one etchant species, and optionally at least one surfactant, **in claim 1**;

wherein the SCF comprises a SCF species selected from the group consisting of carbon dioxide, oxygen, argon, krypton, xenon, and ammonia, **in claim 2**;

wherein the SCF comprises carbon dioxide, **in claim 3**;

wherein the co-solvent comprises at least one C₁-C₆ alcohol, **in claim 4**;

wherein the co-solvent comprises methanol, **in claim 5**;

wherein the co-solvent comprises isopropanol, **in claim 6**;

wherein the sacrificial silicon-containing layer comprises a silicon-containing species selected from the group consisting of silicon oxide and silicon nitride, **in claim 7**;

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wherein the surfactant comprises at least one nonionic or anionic surfactant, **in claim 10;**

wherein the nonionic surfactant is selected from the group consisting of fluoroalkyl surfactants, polyethylene glycols, polypropylene glycols, polyethylene ethers, polypropylene glycol ethers, carboxylic acid salts, dodecylbenzenesulfonic acid, dodecylbenzenesulfonic salts, polyacrylate polymers, dinonylphenyl polyoxyethylene, silicone polymers, modified silicone polymers, acetylenic diols, modified acetylenic diols, alkylammonium salts, modified alkylammonium salts, and combinations comprising at least one of the foregoing, **in claim 11;**

wherein the nonionic surfactant comprises a modified acetylenic diol, **in claim 12;** and

wherein the etchant species is XeF_2 , **in claim 15.**

Since Xu's formulation is the same as applicants' claimed composition, then using Xu's formulation in the same manner as claimed by applicants would inherently result wherein the sacrificial silicon-containing layer consists essentially of silicon, **in claim 14.**

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu (US '225 A1) as applied to claim 1 above, and further in view of Mullee (US 6,306,564 B1).

Xu differs in failing to teach wherein the etchant species comprises at least one bifluoride compound selected from the group consisting of ammonium bifluoride, tetraalkylammonium difluoride ((R)₄NHF₂), and alkyl phosphonium difluorides ((R)₄PHF₂), wherein R is a C₁-C₄ alkyl group, **in claim 8**; and wherein the etchant species comprises ammonium bifluoride, **in claim 9**.

Mulle teaches a stripping chemical comprising: supercritical CO₂ and one or more chemicals such as ammonium bifluoride in removing resist, residue, or other contaminants on a wafer (column 3, line 67 – column 4, line 39).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Xu's formulation by employing ammonium bifluoride as taught by Mulle since using ammonium bifluoride along with organic and /or inorganic

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stripping solvent(s) supported by supercritical CO₂ is known to effect the removal of contaminants from a wafer surface (Mulle, column 1, lines 9-14).

6. Claims 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu (US '225 A1) as applied to claim 1 above.

Xu differs in failing to specify wherein the etching composition comprises about 75.0 wt % to about 99.5 wt % SCF, about 0.3 wt % to about 22.5 wt % co-solvent, about 0.01 wt % to about 5.0 wt % etchant species, and about 0.01 wt % to about 5.0 wt % surfactant, based on the total weight of the composition, **in claim 13**; and

wherein the etching composition comprises about 75.0 wt % to about 99.5 wt % SCF, about 0.3 wt % to about 22.5 wt % co-solvent, about 0.01 wt % to about 5.0 wt % etchant species, based on the total weight of the composition, **in claim 16**.

However, Xu illustrates the specific combination of SCF, co-solvent, and etchant species is known. As a result, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select any proportion (of wt %) of SCF, co-solvent, and etchant in the Xu reference that would effectively accomplish the disclosed composition because it has been held that there is no invention where the difference in proportions is not critical and was ascertained by routine experimentation because the determination of workable ranges is not considered inventive. See *In re Swain and Adams*, 70 USPQ 412 (CPA 1946).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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August 10, 2005

NADINE G. NORTON
SUPERVISORY PATENT EXAMINER
